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ABSTRACT

This guide is the second of three documents that make up a Professional Development Package for Educational Systems Design. The intended audience for this guide is a leadership group empowered to provide leadership, policy direction, and support for a design effort. This group may consist of the educational leadership in a community in cooperation with the school board and other key community leaders. Organized around key concepts and requirements that leadership must address to initiate and sustain an effective design inquiry process, the guide is to be used in a 3-day workshop for a leadership group. The listed purposes of the workshop are as follows: (1) to develop further knowledge about the process and requirements for educational design; (2) to develop awareness and appreciation of the roles and organizational capabilities and capacities necessary for a design process; and (3) to assist the leadership to explore the various dimensions and options for shaping a design inquiry process and for establishing general parameters for the designers. (MLF)

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THE TRANSFORMATION OF EDUCATION BY DESIGN:

A Leadership Guide for Educational Decision Makers

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EA 022 715

THE TRANSFORMATION OF EDUCATION BY DESIGN

A Leadership Guide
for
Educational Decision Makers

Bela H. Banathy
C. Lynn Jenks

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LEADERSHIP GUIDE

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PREFACE

This guide is the second of three documents that make up a Professional Development Package for Educational Systems Design. Together, the documents constitute an integrated package designed to help the intended audiences (educators and others) accomplish specific purposes relative to a communitywide systems design effort. Some overlap in audiences is expected since everyone involved in the educational design effort will have read the orientation guide as a first activity. The three documents are described below.

1. THE TRANSFORMATION OF EDUCATION: BY DESIGN: An Orientation Guide for Educational Decision Makers

Audience: Policy makers, community leaders, public and private sector leadership, school board members, professional educators in public and higher education, parents, students, and others concerned with education and human development.

Purposes:

- To explore the implications for education of the rapidly changing societal environment and advances in knowledge about learning and human development
- To develop among educational stakeholders an appreciation of the power of design for creating more appropriate systems of learning and human development
- To help stakeholders to explore and reflect upon their responsibilities for — and the specific contributions they can make to — the redesign of education

How Used: The orientation guide is ideally used in a one-day study and discussion session for educational and community leadership. Participants should have read the manual prior to the session.

How Organized: The guide is designed to provide readers with a basic understanding of educational systems design. It provides an overview of the process as it might take place within a school district and community. It is also intended to convince readers and orientation session participants of the importance of educational design as the needed strategy for reform.

2. THE TRANSFORMATION OF EDUCATION BY DESIGN: A Leadership Guide for Educational Decision Makers

Audience: A leadership group empowered to provide leadership, policy direction, and support for a design effort. This group may be organized by (or consist of) the educational leadership in a community in cooperation with the school board and other key community leaders.

Purposes:

- To develop further knowledge about the process and requirements for educational design
- To develop awareness and appreciation of the roles and organizational capabilities and capacities necessary for a design process
- To assist the leadership to explore the various dimensions and options for shaping a design inquiry process and for establishing general parameters for the designers

How Used: This guide is to be used in a three-day workshop for a leadership group. Participants will extend their knowledge and understanding of design by exploring and developing plans for their own leadership roles for guiding, providing support, and mobilizing the community in an educational systems design effort.

How Organized: The guide is organized around key concepts and requirements that leadership must address to initiate and sustain an effective design inquiry process.

3. TRANSFORMATION OF EDUCATION BY DESIGN: A Trainer's Guide for Educational Systems Designers

Audience: This guide is intended for the core design team. The team is established by the leadership group and is responsible for conducting the design effort. Members of this team will be, for the most part, educators and others who will have responsibility for the eventual implementation of the new design. They are user-designers.

Purposes:

- To develop needed capability (knowledge and skills) of designers to engage in a design process

- To assist designers to develop a detailed plan that specifies the steps, tasks, needed resources, arrangements, etc., necessary to conduct a systems design effort in the school district and community

How Used: The most effective use of the guide will be with intact teams of persons from communities who have been designated as members of the core design team and who are able to meet with one or more trainers. Participants address design questions and issues in the context of their own work environment. Teams will participate in a five-day intensive training workshop aimed at developing the readiness to initiate their own design effort.

How Organized: This guide is organized around the full set of design process tasks and activities. It gives minimal information about design, focusing instead on learning and application exercises, tasks, implementation guidelines, and additional resources for the conceptual content concerning design (for example, *Systems Design of Education: A Journey to Create the Future* by Bela H. Banathy, Educational Technology Publications, In Press).

INTRODUCTION

A systems design process requires the active participation of school district leadership and the community. A knowledgeable leadership group is needed to provide learning and support and to ensure the ongoing commitment of all those involved in the process. Its members should include representatives of the educational professions, school board, and public and private sectors, including various community groups.

The job of the leadership group is to oversee the design process, select and establish design teams, determine review and approval procedures for design outcomes, formulate initial guidelines and boundaries for the design process, acquire resources, develop and mobilize commitment in the community, and generally provide a guiding and supporting voice for educational systems design.

This leadership guide is the second in a series of three documents to help school districts and the communities they serve learn about, initiate, and sustain a systems design effort.

The first document in this series, The Transformation of Education By Design, served as an orientation to using systems design for educational renewal. It introduced the process of organizational inquiry and systems design (see Figure 1) through which organizations engage in analysis, prepare for design, engage in design, develop and implement the new system, and manage the system.

This guide explores the process and principles introduced in the orientation guide in more depth and focuses on the leadership group's role as initiator and supporter of the entire process. To successfully carry out their functions, leadership group members must

1) understand systems design and leadership's responsibilities for design

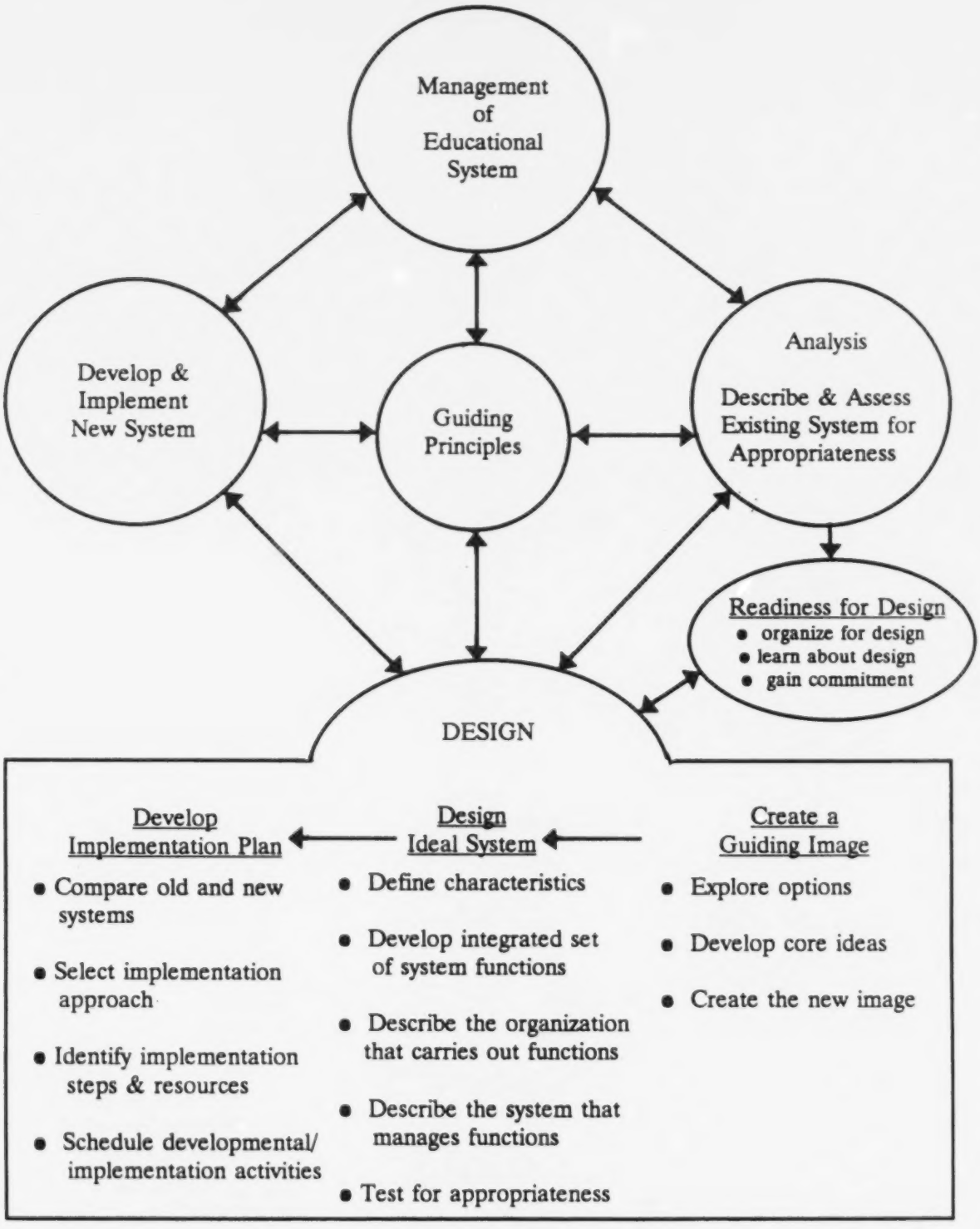
2) understand and work with attitudes toward change and change styles

3) be prepared to initiate and support the design effort

The guide is organized according to these three areas. In each section, background information is followed by a series of questions and exercises to help leadership group members organize themselves to formulate policy and provide the leadership necessary for a successful design effort.

Figure 1

ORGANIZATIONAL INQUIRY IN EDUCATION
WITH A FOCUS ON SYSTEMS DESIGN


Management of Educational System
Develop & Implement New System
Guiding Principles
Analysis
Describe & Assess Existing System for Appropriateness
Readiness for Design
• organize for design
• learn about design
• gain commitment
DESIGN
Develop Implementation Plan
• Compare old and new systems
• Select implementation approach
• Identify implementation steps & resources
• Schedule developmental/ implementation activities
Design Ideal System
• Define characteristics
• Develop integrated set of system functions
• Describe the organization that carries out functions
• Describe the system that manages functions
• Test for appropriateness
Create a Guiding Image
• Explore options
• Develop core ideas
• Create the new image

PART I: UNDERSTANDING SYSTEMS DESIGN* AND LEADERSHIP'S RESPONSIBILITIES FOR DESIGN

The Transformation of Education By Design: A Leadership Guide for Educational Decision Makers will focus on the existing mismatch between our rapidly changing society and the current educational system. By understanding how education functions as a system within the larger systems of community, society, and the world, people can begin to explore the need for new systems of learning and human development and their own personal and collective responsibilities for designing these systems.

Understanding systems design and recognizing its power for transforming education are prerequisites for engaging a community in the design of its educational and human development services. Because design ideally benefits all members of a community, this understanding cannot be limited to a few. It must be generated across the community to reach policy makers, leaders of the public and private sectors, representatives of the many community groups, professionals at all levels of the educational system and in social service organizations, parents, students, and anyone else with an interest in education and human development. Only such a broad-based designing community will be empowered to make significant contributions to the design of its educational and human service systems.

Because generating community understanding of systems design for education is a key part of the leadership's role, knowledge of systems thinking and design is necessary background for all leadership group members.

SYSTEMS THINKING AND EDUCATION

Through studying and working with social systems over the last couple of decades, we have learned to recognize the limitations of the perspectives, methods, and tools of traditional analytically oriented inquiry. Out of necessity, systems thinking and its application — systems inquiry — emerged. Systems inquiry orchestrates the findings of various disciplines and introduces approaches and methods for the analysis, design, development, and management of complex organizations and societal systems. Education is such a system.

Systems thinking helps us understand the true nature of education as a complex and dynamic system that operates in changing environments and interacts with a variety of other societal systems. The application of systems thinking in education enables us to

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* Adapted from a part of *Systems Design of Education: A Journey to Create the Future.*

- understand how education is nested in the community and in the larger society

- describe the nature of education as a complex system of interacting components that mutually affect each other

- describe the educational system's purposes and boundaries from an examination of its interactions with the larger environment

- describe the behavior of education (as a system) and the changes that are manifested in its functions, components, and their interactions through time

Systems thinking generates insights that empower us to (1) pursue the kinds of inquiry described above, (2) organize the findings of our inquiry in the form of comprehensive system descriptions (models) of educational organizations and arrangements, and (3) design systems of learning and human development.

A DEFINITION OF DESIGN

In an age when the speed, intensity, and complexity of change increase constantly, our ability to shape change rather than become its victims or passive recipients depends on our competence in using models, approaches, methods, and tools that will empower us to participate in the design of our systems. Human activity systems, organized at various levels of society, from the family on up to global systems, can give direction to their continuing development and shape their future by engaging in systems design.

Systems design is part of a creative decision-oriented organizational inquiry that seeks to fully understand the existing educational system; define aspirations, purposes, and requirements for an ideal educational system; create an image of the new system to guide a system design process; describe the new, ideal system; and develop an implementation plan for its implementation.

Design is an ongoing journey of creation. In organizations that are "alive" and want to coevolve with their environment, design never ends. If education wants to remain viable in our constantly changing environment and become responsive to society, then the journey of creation — the process of design — must be continuous, leading us to design systems that will be capable of nurturing learning and human development.

SOME GUIDING PRINCIPLES

As members of an educational leadership group, your specific responsibilities include providing general guidelines to a core design team for the design process and the basic boundaries within which the design process will unfold. At the center of the design

inquiry (Figure 1) are guiding principles we believe are essential to the success of this inquiry and design process.

Participation in Design is Inclusive. Those who participate in the design inquiry should include those who will be directly affected by it or will be the users of the new system. Participating in design enables members of the organization to better understand their organization; nurtures creativity in individuals; incorporates individual and collective aspirations and values into the design; and generates consensus and commitment in the group, ensuring that people will take part more effectively in the process of design and its implementation.

Design is Learning. By engaging in design we learn as individuals and as an organization. We learn to reexamine our purposes and goals and our perspectives, values, and modes of operation. We develop new knowledge and insight, which become the basis for designing our system.

Design is a Process of Realizing Ideals. The commitment to design is a commitment to creating and remaining focused on our image of the ideal system of education. That image becomes the guide for realizing the new system.

Design is Continuous. As an organization moves toward realizing its new design, the environment and situational context in which the system operates will change. Thus, the ideal system model will need constant reexamination and revision. Furthermore, the values that guide the design and shape the design may also change in response to the process.

Design is for Human Values and Human Quality. The educational organization is a system that values and serves people. Designing a just system for both present and future generations is of the highest priority. The process of giving direction to our educational future is the primary purpose of the design inquiry process.

Activity

1. First in small groups, then in the large group, discuss the design principles and reach a consensus concerning their implications. For example, if the process is to be inclusive, how will representation be ensured?

THE ORGANIZATIONAL INQUIRY: THE ANALYSIS AND DESIGN STAGES

Although organizational inquiry, as shown in Figure 1, consists of four major stages, only Analysis and Design are addressed here. These are of primary concern for a

leadership group as well as for the core design team. (Responsibility for specific steps is indicated in parentheses.)

ANALYSIS

The Analysis Stage involves two types of inquiry. The first is concerned with exploring the various problems the community's educational system is facing and identifying which of those are of particular concern. The second inquiry attempts to develop a comprehensive description of the existing system utilizing the three perspectives or Systems Lenses introduced in the Orientation Guide. This description will provide designers with a basis for determining the organization's need to engage in design. The description will also provide a basis for later comparison of the new design with the existing design.

Examples of questions to ask at this stage are listed below. These are representative only. As you think through your own situation, additional questions may emerge. Answers to questions such as these will generate a rich understanding of the context in which the design process will be conducted.

A. Exploring the Problem Context (Leadership Group Responsibility)

(1) Why should we engage in a design effort?

(2) What in our present social environment calls for rethinking our educational system?

(3) What problems or conditions exist within the present system that demand changes?

(4) What problems or issues exist with which our present system is unable to cope?

(5) In what ways are these problems related?

(6) What will happen if we continue unchanged?

B. Describing the Present System (Core Design Team Responsibility)

The sample questions for the core design team to consider at this stage are organized according to the three perspectives or Systems Lenses that were introduced in the Orientation Guide. (Please refer to that document for clarification.)

Systems-Environment Lens

(1) What relationships exist between the school district and the community?

(2) What are the primary kinds of interactions between the school district and the community? Who communicates with whom in what ways?

(3) How do the school district and other social agencies in the community interact?

(4) What are the relationships and/or interactions between the educational system and the larger environment external to the community?

Functions-Structure Lens

(1) What purposes and goals does our existing system pursue?

(2) What educational and/or developmental services are being provided and for whom?

(3) What functions are being performed to ensure that the services delivered are appropriate and effective?

(4) How is the present system organized to ensure that the functions are performed? By whom?

Process-Behavior Lens

(1) How does the present system acquire, process, and utilize information and resources for use in and by the system?

(2) What are the decision-making processes?

(3) How is performance assessed and how are adjustments and changes made?

(4) What kinds of changes tend to be initiated and what change processes are utilized?

Answers to these questions will help the school district and community to answer other, more central questions, such as:

- What do we value in our present educational system and organization? What in the present system prevents the realization of important values?

- What in the present system prevents or hinders our continuing development? What barriers to our continued development exist in the larger environment?

Activity

1. In small groups, address the six questions listed above in section A. Then meet as a large group to discuss your answers and reach conclusions.

DESIGN

The Design Stage of organizational inquiry is described below in three steps — creating a guiding image, designing the ideal system, and developing an implementation plan. The leadership group will be primarily concerned with the first, creating a guiding image.

A. Creating a Guiding Image (Leadership Group)

One of the primary functions of the leadership group is to provide the core design team with guidelines for the design effort. These include establishing boundaries for an educational system's three dimensions, defining core ideas about the role of education, and creating a guiding image of a new system of education. The guiding image then becomes the basis for designing a new and preferred system of human growth and development.

1. Exploring Options: Focus, Boundaries, Relationships

The Design Framework (illustrated in Figure 2) provides the dimensions for exploring options in educational systems design.

The three dimensions **Primary Focus, Boundaries**, and **Relationships With Other Systems** — reflect the main dimensions of an educational system with which systems design is concerned.

By illustrating the options within each dimension, the framework permits us to portray the existing educational system and consider in what areas we would like to expand its boundaries and relationships or redefine its focus. Our choices set the initial parameters of the design process and, ultimately, of the new system.

Primary Focus

Focus tells us what people and what related activities and goals are given the most power and priority in an educational system. In considering the four options of this dimension, we might also ask what values are associated with each focus and how well a system with that focus fills our educational and societal needs.

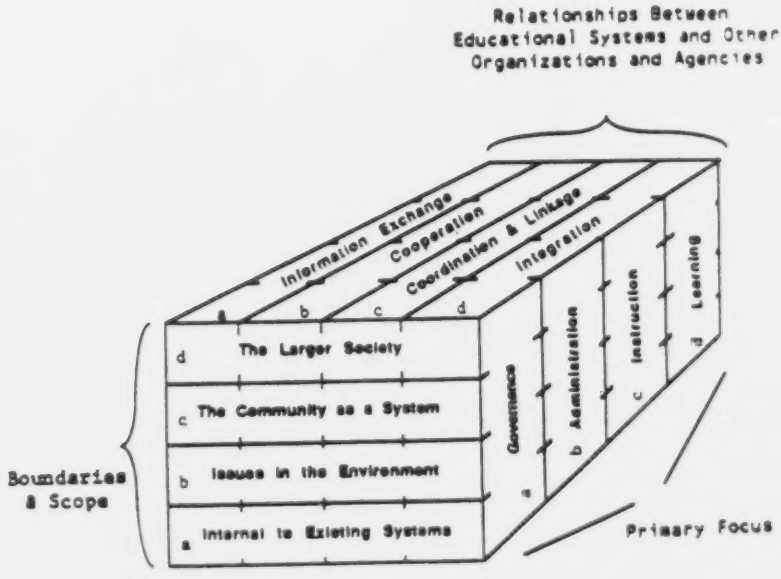
a. *Governance* is in focus when the purpose of education is defined as indoctrination and acculturation. Top decision makers determine policies and mandate curriculum and instruction.

b. *Administration* is most commonly the focus in today's public schools. In the usual arrangement, administration defines the instructional content and sometimes even the methods. Governance sets policies and secures resources.

c. When the *Instructional Level* is in focus, administration and governance provide policies and resources for its support. The instructional system defines the content and method of instruction, and students are asked to respond to it. Some recent restructuring efforts have proposed a realignment of instructional leadership by shifting instructional authority to teachers.

Figure 2

Design Framework: Exploring Options in Educational Systems Design



d. With a focus on the *Learning Experience*, students are the center of the educational system, and the system's main function becomes the facilitation of learning. Components of the educational system (teaching-learning arrangements, learning environments, etc.) interact to support the goal of learning. Such a focus is rarely found today.

Boundaries

Boundaries indicate to what extent the educational system includes the larger community and societal environment. Our choice of boundaries also defines the scope of our design inquiry.

a. Design that is limited to the *Existing System* is typical of current improvement programs. These usually involve attempts to solve specific problems related to management, instructional effectiveness, staff development, etc.

b. By broadening our attention to include *Issues in the Environment*, the design inquiry may consider problems that cross over the boundary between the school and the community, for example, drug abuse, teen pregnancy, students at risk. But the primary focus remains within the boundaries of the existing school or district organization.

c. When our boundaries are extended to include the *Community*, other societal systems, organizations, and agencies might be involved in providing resources and arrangements for learning. Examples include internships, projects using community resources, field trips, and other experiential learning arrangements.

d. The broadest boundary considers educational systems in relation to the *Larger Society*. With this perspective, educational systems not only respond to the problems, challenges, requirements, and goals of our rapidly changing society, but take an active role in shaping societal development. Some possibilities might include community volunteerism, global education issues, cross-cultural learning, continual exploration of larger societal issues, and other examples not yet dreamed of.

Relationships With Other Systems

This dimension has to do with relationships between educational systems and other systems and organizations within the larger environment, the content of their interactions, and the values and responsibilities associated with their arrangement.

a. *Information Exchange* is the most frequent pattern seen today. It involves simply informing the community about the schools and gathering information about the community for use in the schools.

b. *Cooperation* involves interaction between schools and outside institutions to meet complementary goals or share resources. For example, community-sponsored school events to keep kids off the streets or joint projects between community agencies and the school to help the poor. Cooperating agencies remain autonomous.

c. *Coordination* involves formally linking the educational system with other institutions to accomplish mutual goals of education and human development. For example, a school district and social services of a community might together create a program to provide childcare and parent education to the community. With coordination, "ownership" of a particular enterprise (its resources, responsibilities, authority, etc.) is shared by all those involved.

d. Through *Integration*, what we now call school would become a component of a communitywide system for learning and human development. With the integration of systems in the public and private sectors (community organizations and various other agencies), optimal use of varied resources is possible. Integration is the most intensive and highest level of interorganizational relationship. There are no examples yet of this sophisticated concept in action, but examples will undoubtedly emerge through the work of school districts and communities.

The choice of one focus or boundary will most likely influence our choice of options in the other dimensions. For example, if the focus of the system is the learner, boundaries and relationships with other systems will probably be defined to acquire resources and accomplish goals related to learner-focused education.

The use of the framework dramatizes differences between current approaches to education, which are generally limited to options a and b, and the systems design approach to fundamental change, which emphasizes boundaries c and d (for example, the most progressive design would select options focus-learner, boundaries-society, and relationships-integrated).

But choices cannot be prescribed for all communities and all school districts. The unique "ecology" of a specific community must be considered by those who would design a new educational system within that context. Thus, choice of options and means will be different for each design community. However, we do urge you to aim as much as possible for at least the community level as your boundary, cooperation-coordination for relationship to other systems, and, most important, to place the learning level in focus.

As you can see, the Design Framework is much more than an analytical tool. It encourages us to jump beyond the boundaries of existing systems to consider new options and even envision new systems of education. In the process we begin to generate new ideas for ourselves about education.

Activities

Establishing general boundaries for use by the core design team will be the most important task of the leadership group. The activities related to performing this task are detailed and will require approximately four to five hours to complete.

1. In small groups, review the Design Framework for exploring design options. Develop questions and list items that need clarification. Discuss these items in the large group.

2. Explore the focus of inquiry:

   a. In small groups, review the four options and make preliminary choices.
   b. Ask what social conditions and changes might influence your choices and their implications for educational systems.
   c. Report your choices and findings to the large group. As a large group, record and discuss the findings and choices of the various teams.

3. Explore the boundaries:

   a. In small groups, review the four options and make preliminary choices.
   b. Identify and discuss conditions in the school system and the community that help you identify the appropriate focus.
   c. Report your findings to the large group. Together record and discuss all the teams' choices and their implications.

4. Explore relationships with other systems:

   a. In small groups, review the four relationship options and make preliminary choices.
   b. Identify possible learning resources within and outside of the current system and discuss how relationships with other systems might be modified and any implications.
   c. Report your conclusions to the large group. As a large group, record and discuss all the teams' choices and their implications.

5. Display preferred options:

   a. In small groups, develop a rationale for your preferred option selections for all three dimensions — focus, boundaries, and relationships with other systems.
   b. Present your rationale to the large group.
   c. As a large group, record and discuss all proposed options and rationales. Come to a consensus about appropriate option choices. (This will be a tentative conclusion.)

6. a. In small groups, discuss the challenges posed by your particular focus, boundary, and relationship choices. What barriers might particular options face?
   b. Report to the large group and discuss.

7. In small groups, evaluate the usefulness of the Design Framework based on the activities above. Next conduct an evaluation of the Design Framework in the large group.

2. Developing Core Ideas

Core ideas are statements about what we have come to believe regarding the appropriate role of education in our society, the nature of learners, learning, and human development, and how the learning environment affects learning. Core ideas emerge from our own core values, aspirations, and perspectives, our general knowledge base, societal conceptions, and from our answers to questions we pose in the process of design inquiry.

The previous step of determining system and design parameters brought us closer to establishing our core ideas by helping us identify our focus. We need also to be aware of the values that influence our choices.

Here is one example of a core value that might have been identified and shared in the process of exploring and selecting design options:

> Of all the values provided to individuals and to society collectively, the nurturing of learning and human development is the highest.

The next question that should be asked is what implications this value has for our choice of educational system.

For example, given this value and the choices of learner as focus, the community as educational system, and coordination with other agencies and organizations in the community to design and operate components of the new educational system, our core idea statements might include the examples below.

Examples of Core Ideas About Functions and Purposes

- Learning should be provided by which the individual and societal systems develop competence and will become empowered to give direction to their own evolution and development by design.
- Systems of learning and human development should coevolve with the larger society as well as spearhead societal evolution.
- Educational systems should develop the organizational capacity and human capability to engage in continuous organizational learning and design.
- Arrangements, resources, and opportunities should be provided by which to nurture and develop the unique potential of the individual.

Examples of Core Ideas About the Learner and Learning

- There are no limits to learning; learning and human development never end.
- The individual has a basic desire to learn, to seek knowledge and understanding, to become competent.
- The individual is capable of initiating, directing, and assuming increasingly more responsibility for learning.
- The individual's development is best facilitated if his or her uniqueness is recognized, respected, and nurtured.
- Inspiration and motivation are the most powerful facilitators of learning.
- The most potent "satisfiers" to the learner are discovering something new, gaining new insights, and acquiring new skills.
- Self-confidence develops in the learner as a result of mastering learning tasks and using what has been learned in real-life situations.
- Acknowledgement of and respect for individual differences are essential to offering resources and arrangements to learners and creating a climate for learning.

Examples of Core Ideas That Will Guide Design

- Learners should assume the central position in systems of learning and human development.
- Characteristics of the transforming society and requirements that emerge from its transformation are the primary sources for selecting the content of learning.
- We have available in society a large yet untapped resource base for learning and human development, residing in many systems and situations of the community and the larger society.
- The power and the potential of social and human services will dramatically increase by the integration of the various systems that provide for those services and by the design of a comprehensive system of learning and human development.

Activities

1. First as a small group, then together in the large meeting, review the examples above and ask: Do we agree with the idea statements? Do we challenge them? Are there ideas we wish to add?

2. a. In small groups, list and describe the core ideas about the role of education in society and in the community and the role of the community in shaping and supporting education, learners and learning, etc., that emerged from the discussion above. Questions such as the following may be used:

   What are our expectations of and aspirations for the ideal system? What should be the general purpose of our educational system?

   What should be the roles and goals of education in serving learners, the community, the society, and the members of an educational organization?

   What ideas should guide the design of our educational system?

   b. Repeat this activity in the large group.

3. Creating the New Image

Images are powerful. Just as old images can impede our ability to initiate change, new images can pull us toward a new future. Together, the boundary choices and core ideas explored above clarify our concerns and purpose and lead us to an initial image of an ideal system of education. This image will guide us through the process of design, implementation, and ongoing renewal of the new system and will keep us on track with our ideals and intentions.

Given the example of choices and core ideas above, our new image might describe a very different system of education. Following are two sets of perspectives. The left column set is derived from the sample core ideas. The right column, in contrast, is more representative of our current image of education. Keep in mind that an existing image will act as a barrier to moving toward a new image.

THE EVOLUTIONARY IMAGE	THE EXISTING STATE
• We should image education as a societal system integrated with all other societal systems in a cooperative and coordinated relationship.	• Education should be an autonomous social agency, separated from other societal systems.
• Education should reflect and interpret the society as well as shape the society through coevolutionary interactions as a future-creating, innovative and open societal system.	• Education should be an instrument of culture and knowledge transmission, focusing on maintaining the existing state and operating in a closed system mode.
• Education should provide resources, arrangements and lifelong experiences for the full development of all individuals.	• Education should provide for instruction to the individual during his/her school age.
• Education should embrace all domains of human and societal existence, including the sociocultural, ethical, moral, spiritual, economic/occupational, physical/mental, political, scientific/technological and aesthetic.	• Education should focus only on the basics and preparation for citizenship and employment.
• Education should be organized around the learning experience level; arrangements should be made in the environment of the learner by which the learner can attain competence.	• Education should be organized around the instructional level; arrangements are made that enable the teacher to present subject matter to students.
• We should use a variety of learning approaches - self-directed, other directed, individually supported group learning, cooperative learning, social and organizational learning — to enhance individual and societal learning.	• Teacher-class/teacher-student interactions are the primary means for providing instruction.
• We should use the large reservoir of learning resources and arrangements available in the society in order to support learning.	• The use of educational resources and arrangements is best confined to the territory of the school.
• The process and content of learning should be based on a broad interdisciplinary framework which integrates theory and the variety of disciplinary perspectives.	• Education can best be approached from a variety of unintegrated theoretical and disciplinary perspectives.
• In the development and management of educational systems, we should take a broad, systemic, and integrative approach to analysis and continuous design.	• Educational improvement and management must rely primarily on incremental problem-solving approaches.

Activities

The evolutionary image described above is speculative and is introduced here to trigger discussion and further exploration.

1. a. In small groups, formulate your own set of perspectives.

   b. Present and discuss these sets in the large group.

A set of evolutionary perspectives can guide our thinking about the desired future educational system. Any set of perspectives should be internally consistent. An integrated set of perspectives will provide the basis from which the desired future educational systems can be created.

2. The previous step of the design process results in an image based on core ideas about the purposes of education and about learners and learning. This image can be translated into a mission statement that provides everyone concerned about education with a common purpose and guides the design process. In small groups, develop a mission statement that includes what the system is going to do for learners, the community, the larger environment, and other systems and how it sees itself as a system.

The next task, transforming the image into a functioning educational system, will be performed by the core design team.

B. Design the Ideal System (Core Design Team)

Designing the new, ideal educational system involves identifying its characteristics, functions, and the management and organization that will be necessary to implement the design. This stage moves us from an image of an educational system to a detailed description of the ideal system.

Ideal system design is a very practical undertaking. The resulting model permits conceptual testing before we build the actual system. It provides a rationale for selecting changes. It becomes a guide for change decisions. Designers should not let themselves be constrained by notions of feasibility based on the present system. The new model can be tested later for feasibility. It is most important that the model remain a goal to achieve, a target to aim for.

Key steps and sample questions for ideal system design follow.

1. Define System Characteristics

System characteristics may be defined as the requirements of the system. Characteristics are formulated with the ideal in mind and are checked against the image of what the new system should be. They are described in enough detail to help us determine what functions are needed. The characteristics can be developed by answering questions such as the following:

- What kinds of services should the new system provide (e.g., instructional, personal counseling, career development, nutrition, child care, community development, parent training, etc?
- Where and how should services be provided?
- What are the new system's responsibilities to its clients, the community, the larger society?
- How should the new system relate to other systems in the community?
- Who owns the system?

2. Develop System Functions

System functions describe the tasks that will be performed so that the services can be delivered. Some basic questions to be addressed about functions include:

- What key functions are to be selected so that the system attains the mission, purposes, and expectations defined by our core ideas?
- How do these key functions interact and how are they to be integrated to form a system of functions that delivers services to the appropriate clients?

Any system of functions should include the following basic set:

- continuous (re)definition of desired learning outcomes
- defining and arranging for the use of learning resources
- acquiring and maintaining learning resources
- providing and using resources appropriately for learning and development
- managing the key functions

Each of these key functions can be defined as teaching, learning, and resource-related issues. For example, designers might decide that cross-cultural education and an understanding of global interdependence are educational requirements. Learning related to this requirement might be derived from a definition of "acceptable behavior" in cross-

cultural settings. Learning resources might include planned access to community organizations, ethnic groups, museums, community work, readings, etc. Those responsible for identifying, developing, arranging, and managing these resources for learners still must be determined.

3. Describe the Organization

If the new educational design is different from the existing design, the present organizational structure (e.g., governance level, district level, school level, classroom level, etc.) may no longer be appropriate. The basic questions to ask include: Given the clients to be served, the services to be provided, and the functions to be carried out, what kind of organization is needed? What kind of organizational capacity will be needed? What new competencies are required? How will human resources (staff, volunteers, community expertise, agencies) be organized to serve clients? How will resource allocation and other operational decisions be made? How will staff and others develop needed competencies?

4. Describe the Management System

The system design process, thus far, will have produced descriptions of an image of a new system, characteristics of the new system, and a system of functions that must be carried out. The next issue for a core design team will be the nature of the necessary management system. The new management system will need to have the organizational capacity and individual capabilities to guide the educational system and ensure that the functions will be carried out as specified in the functions model.

The basic question we must ask is what kind of a management system will be able to (1) identify actual and potential problems, threats, and opportunities; (2) be able to make and act on decisions appropriately; (3) maintain and improve performance; and (4) ensure the continuous supply of information to those who need it to perform the various functions.

At this point, designers should test for appropriateness: (a) How well does the system we designed satisfy our goals? Did we provide for all the functions that are necessary to ensure the attainment of stated purposes and expectations? Are there any redundant functions? Will the functions empower the system to obtain the systems characteristics as described? (b) Is the ideal system technologically feasible? Is it operationally viable? Does it have the functions-based capacity for continuous learning and adaptation?

The design is now completed. The resulting description provides the comprehensive model of a future system.

Activities

The leadership group's responsibilities during the design process will be to provide support, additional information, and guidance.

1. In small groups, review the design steps and discuss where leadership's guidance might be needed.

2. Meet in the large group to formulate a statement regarding leadership's role at the design stage.

C. Develop An Implementation Plan for the New Design (Core Design Team)

The new system description is now compared with the description of the present system we generated at the Analysis Stage. The comparison will point out discrepancies between the two descriptions, which will become the basis for planning the means and methods by which we can close the gaps between the system we now have and the system we want to have.

The inquiry at this stage will be guided by questions regarding the activities, processes, and procedures needed to bring about implementation of the new design (described in document three, A Trainer's Guide For Educational Systems Designers).

THE SYSTEMIC NATURE OF DESIGN

In moving through the design stages described above, it is important to keep in mind that the design process itself is systemic and involves several characteristics and principles:

- The type of system to be designed will influence the selection of design approach and methods. For example, the approach and the methods we use in designing a system that is open to new purposes will have to be very different from the design approach called for in systems that are highly controlled and not open to change.

- The prevailing approach to school improvement is to prepare a plan which, if followed, corrects deficiencies in an existing system. Systems design, on the other hand, says that the outcome of design will be a description of the comprehensive system that "should be" — one that has the organizational capacity and people capability to implement purposes and carry out functions that were formulated during the design process.

- Synthesis and Integration. Core ideas and values are synthesized to create an image of a desired future system. From the integration of selected characteristics and components, the ideal model of the future system is designed.

- The law of "requisite variety" requires us to understand the complexity and variety of the environment in which the system is embedded. A corresponding variety should be built into the system that is designed. This law has wide implications for design, which include (1) providing a learning agenda that responds to the variety of competence requirements and human development needs of the current society, (2) making arrangements in the environment of learners that meet and respond to their uniqueness and individual needs and aspirations, and (3) obtaining and using the diversity of values and perceptions to be found in the community.

- In the design of educational systems, we should open up the boundaries of the system we design as far into the environment as possible. As a rule, recent educational improvement efforts have stayed within the boundaries of the existing system and thus have tended to focus on improving the existing system rather than consider alternative designs.

- We should not look for linear cause-and-effect relationships among the system's components. Systems relationships are always multiple and mutual and are of recursive causality. A change in any one part of the system we design affects the total system, and a change in relationships between and among parts will have a total systemic effect.

- Design is not a lockstepped linear process. It operates in the feedforward, feedback, and interactive mode which constitutes the dynamics of systems design. At any decision point of the design process — and there are many — designers may jump way ahead in speculating about what might come later in the course of the design (feedforward and work back from it). In the same way, designers might go back to earlier formulations and ways of thinking about the design and reformulate the perspectives that guide their design, reconsider earlier decisions, or even reformulate the problem situation that gave rise to the design effort (feedback). All the above may lead to a change in the shape of the design. Design is a process of formulating and testing various alternatives through several interactions until we develop enough confidence in a particular formulation to select it for implementation.

Activity

1. As a group, look for examples in your present system that exhibit systemic thinking and for some that do not illustrate systemic thinking.

REFORM STRATEGIES: MAKING DISTINCTIONS BETWEEN SYSTEMS DESIGN AND OTHER APPROACHES

> Design lies at the heart of professional practice.
> — David Schon*

To encourage educators and others to think beyond the conventional and become familiar with concepts and ideas associated more strongly with systems design, in this section a number of conventional reform strategies are defined (see Table 1) and contrasted with the "design point of view." The contrasts are not used to suggest appropriateness or inappropriateness. The so-called conventional strategies are complementary at some points in the process of systems design and in some situations. But, when used exclusively to guide thinking or behavior, they impose an "improvement" point of view on educational reform, thereby maintaining an educational system whose viability in its present form should be questioned.

Table 1

Reform Strategies

Other Strategies	Systems Design
• planning	• design
• single loop	• double loop
• single track	• dual track
• adjustment	• coevolution
• change by chance	• self-directed change
• revolution	• controlled change
• piecemeal	• systemic
• inside-out	• outside-in
• design for the future	• design the future

* Presentation, AERA, Boston, April, 1990.

Planning and Design

Educational planning most often produces a carefully prescribed sequence of steps that are intended to move the organization or one of its components to a more desired state. Planning tends to begin with the existing organization and defines goals and objectives that represent an improved position or status. Strategies are developed and an overall time frame (1-3-5 years) is often established for achieving the stated goals.

Systems design, in contrast, does not take the current organization as the necessary point of departure. Design attempts to describe an ideal educational system that can be responsive to the values, aspirations, and expectations of the learners and the community and society it serves. The new design is derived from an image of a future system. Instead of establishing a time frame, the systems design process is continuous. The design that is created becomes the target that, although never fully reached, guides organizational change, renewal, and organizational learning.

Planning comes into the design process once the new system has been described and there is an intention to develop and implement it. The new design, because it represents the ideal, may be revolutionary (or at least very different from the existing system). However, its implementation will most likely be evolutionary and require careful planning.

Single-Loop and Double-Loop Organizational Inquiry

The terms single loop and double loop were introduced to help understand organizational learning (Argyris and Schon, 1978). Single-loop learning takes place when the detection and correction of errors permits the organization to maintain its present policies and practices or to achieve its present objectives. Single-loop learning has been compared to a thermostat that controls the temperature of a room by turning the heat on and off, thus maintaining a previously established norm. School systems that engage only in single-loop learning focus on detecting and solving problems that threaten to disrupt the operation of the present system.

Double-loop learning occurs when the organization moves out from its boundaries and looks back at itself. It reconsiders its underlying norms — its mission, purposes, and policies — and engages in design based on its findings.

Single Track and Dual Track

We seldom have the luxury to shut down existing social systems while developing new ones. Existing educational systems must operate uninterrupted and continue to address issues of efficiency and effectiveness because learners are being served even as

new systems are being designed. Therefore, a dual track inquiry is necessary. One track is concerned with the efficiency and effectiveness of the present system. The other track is concerned with the appropriateness of the present system and engages in design inquiry (double-loop learning). The two tracks are not isolated but inform each other.

Adjustment and Coevolution

When educational systems engage in design inquiry, and therefore double-loop learning, one of the issues to be faced is the relationship of the educational system to its environment. This exploration (often referred to as environmental scanning) leads to a better understanding of the environment. Based on the resulting understanding, decisions can be made that enable the system to better align itself with environmental demands and conditions. The alignment is driven by the system's continuing need for support and resources from the environment. This strategy leads to systemic adjustment to the environment.

Coevolution is based on the concept of mutuality between the system and its larger environment. This means not only that the environment shapes the system, but that the system concurrently shapes the environment. For example, when the educational system has the responsibility to explore new relationships and find new opportunities for support and resources in the larger environment, the environment is shaped in the process. It is proposed that the societal function of education can best be conceptualized and served when the relationship between education and society is defined as primarily coevolutionary. The challenge is to establish an appropriate balance between adjustment and coevolution.

Change by Chance and Self-Directed Change

We can imagine situations in which an organization drifts in a particular direction as a result of external events or forces. In this case, organizational direction is not selected by the system and people within the organization often feel powerless to influence or shape the direction of change.

Self-directed change in organizations is powered by the determination of the organization to define and select its own future and course of action rather than be subject to or directed by external events or forces. The strategy for self-direction is design inquiry. Chance will always operate in open social systems, but the main thrust of systems design is self-direction.

Revolution and Controlled Change

Revolution is a sudden change that completely transforms a societal system. Such transformations are usually designed by a few people who assume power and drive the system toward realization of their vision. Revolution is usually stimulated by a closure in the existing system as it refuses to respond to signals within and outside of the system that call for change. In such circumstances, even a small fluctuation within the system or its environment may bring about chaos and revolution.

In controlled change, a design is formulated based on a shared vision of people who participate in the system. That vision may be revolutionary in its newness, but the move toward the realization of the image is evolutionary. Strategy for its design and implementation are similar to the self-directed change described earlier.

Piecemeal and Systemic Change

Creating conscious systemic change requires an understanding of the total system and its context/environment, based on four principles: (1) Any change in any part of a system affects the whole system, and any change in the whole system affects all the parts. (2) The system is more than the sum of its parts. The relationships that exist and operate among the parts and the emergent effects of those relationships represent the critical dimension of a system. (3) A change effort should not occur haphazardly. Instead, systemic change strategies must be utilized. (4) Systemic changes, even the smallest ones, are viewed in terms of the relationship between the system and its environment.

Piecemeal change disregards the principles above and focuses on tinkering with or changing parts in an effort to improve the system. Change is not mapped into the whole system; changing a part is contemplated without considering its effect on the relationships that operate among parts and between the system and its environment. Because of the nonsystemic nature of piecemeal changes, they tend to be short lived or become substantially modified to fit existing practices and preferences.

Restructuring and Design

Restructuring often refers to rearranging the parts of a system or the roles played by parts or people in the system. For example, the focus may be on changing roles or responsibilities for decision making, usually at the school level. Role changes at the school level may lead to important changes in the instructional program, but there is no specific emphasis on systemic change. Because systems design doesn't focus on parts, it is quite different from restructuring. Unlike restructuring, the design strategy aims to realize a stated mission by designing new functions in new relationships.

Inside-Out Inquiry (Improvement) and Outside-In Inquiry (Systems Design)

Inside-out inquiry focuses initially on the present organization. Inquiry often begins with an analysis of the existing system in terms of strengths and problems and the use of strategies to eliminate the most severe problems. In other words, the existing system is the unit of analysis. Because the analysis tends to be problem focused, change efforts are usually piecemeal. It is assumed that the existing system will remain more or less intact. An improved version of the present system is the goal.

Outside-in inquiry is based on the principle of coevolution between the system and its environment. It assumes that the characteristics and requirements of the larger environment are the primary source of knowledge for creating a new, ideal educational system. When there is a substantial discrepancy between what a given societal system can provide and what the society requires, an evolutionary gap exists. When this condition is present, an outside-in approach to design inquiry is necessary.

Designing for the Future and Designing the Future

Designing for the future assumes that we can know what the future will be. This assumption is based either on projections of current trends or on scenarios created by futurists. Designers use these extrapolations to design their systems for the future.

Designing the future means taking responsibility for its creation and evolution. It is based on the belief that we have the power to engage in the design of our systems, enlightened by an understanding of the characteristics and requirements of our environment and inspired by our own aspirations and expectations.

The preceding material introduced pairs of concepts. The pairs were contrasted, perhaps overly so, to accentuate how systems design differs from more conventional strategies that tend to dominate educational reform efforts. Conventional strategies are appropriate when a new design has been created and the organization is ready for implementation planning. They may also be useful for making adjustments following the implementation of a new design.

However, systems design strategies are needed (1) to guide the creation of an appropriate educational system and (2) to ensure that the system remains consistent with the conditions of our rapidly changing society.

Activity

1. a. In small groups, discuss each pair, compare understandings, clarify meanings and distinctions.

   b. Discuss the relevance and appropriateness of the various concepts for the kind of educational system change believed to be needed in your community.

PART II: ATTITUDES ABOUT CHANGE (All Groups)

To ask larger questions is to risk getting things wrong.
Not to ask them at all is to constrain the life of understanding.

— George Skinner

Comprehensive systems design often produces descriptions of new educational systems that are profoundly different from existing ones. This happens because in systems inquiry, questions new and very different from those raised by current improvement efforts are asked. If a new design is to be implemented, fundamental changes can often be anticipated. And fundamental changes require new ways of thinking.

School districts and the communities they serve usually operate with sets of values and beliefs about their organizational purposes and strategies that tend to shape the way things are done. In preparing for systems design, it is most important that those involved examine the particular change styles they and their organizations foster and ask whether these are appropriate for a systems design effort. Systems design requires an open-mindedness, both in entertaining new outcomes (goals) and exploring various new approaches for getting there. New decisions must be made throughout the design process, and it is important not to be locked into old attitudes about change.

In this section, participants will have the opportunity to explore the four main change styles defined by Ackoff (1981) and develop a better understanding of their implications for organizational behavior and outcomes and their relevance for managing educational change. Participants will be asked to assess the style they prefer as well as those dominant in their organization.

The overriding differences between these styles derive from their various orientations, which are listed as the ten dimensions in Table 2. Most often a style does not show itself in a pure form but as the major influence in a mixed style. Styles may also vary depending on the specific issue, situation, or individuals involved. In all cases, however, a dominant orientation exists, and the resulting influence on change decisions tends to be substantial.

Costs and benefits are associated with each style. In this presentation, the interactive style — the least understood and least practiced by planners — is offered as the most effective and productive style for change management.

Table 2

CHANGE STYLES

	Reactive 1	Inactive 2	Preactive 3	Interactive 4
1. Attitude toward change	restoration, "good old days"	maintenance, resist change	accelerate change, exploit opportunities	give direction to change, images
2. Arrow of time	reverse, "back to the basics"	remain in the present	look to the future, impatience	past, present, & future integrated
3. Problem & change management	simple cause & effect explanation	delayed reaction, ride it out, return to equilibrium	rely on forecasts, fear of cost-regret	focus on what might be, design a desirable future, coevolve
4. Role of science	experience is best teacher	current events provide necessary guidance	science of prediction, risk analysis, PPBS	disciplined inquiry
5. Role of technology	technology as cause of change	status quo, avoid technology unless it promises more efficiency or effectiveness	embrace technology as potential panacea	use technology as means of creating the future
6. Organization model	authoritarian	basically bureaucratic	purposive, ends - autocratic, means - democratic	system integration
7. Organization culture and values	nostalgia	preoccupation with customs, rules, & conventions	inventiveness, growth	humans as ideal seeking, not just end seeking
8. Approach to planning	top-down, perhaps ritualistic	focus on maintenance	top-down, predictive, contingency planning	planning to achieve ideal future
9. Working with problems	piecemeal	disjointed incrementism, "muddling through"	shift emerging problems to the future, postponement	identify the right set of problems
10. Attractiveness	maintains a sense of history, continuity, security	some problems fade if left alone, avoid big mistakes	progressive	best chance of coping with complexity

Type A: Reactive Style (Back to the Future)

1. General Attitude Toward Change

The dominant orientation of this change style is toward restoring the organization to its previous stage by "unmaking" changes that have happened. Effort and energy are focused on "swimming against the tide of change" and wishing to return to the shore from which change has pulled us. We romanticize, for example, about the "good old days" when we had no teachers' unions and no disciplinary problems.

2. Dealing With the Arrow of Time

Again, the reactive style's resistance to change is reinforced by a strong orientation toward the past. Our vision is focused on where we have been instead of where we are going as we seem to drive toward the future by looking into the rearview mirror.

3. General Approach to Problem and Change Management

Here a one-directional cause-and-effect view governs our thinking about change: Every problem we face was created by something or someone, and if we just discover the cause (or the one who caused it) and suppress or remove it, the problems will disappear. Dismissing students with bad attendance records or with disciplinary problems are examples of trying to remove the cause. Such action may solve the school's immediate problem, but will create a larger problem for society.

4. Perception of the Role of Science

Consonant with the reactive style, our evaluations and decisions are rooted in the perception that "experience is the best teacher." Looking for answers to questions posed by organizational problems and issues related to environmental changes, we seek guidance from past experiences and history rather than from the current knowledge base offered by science and research relevant to social and educational systems. Rather than disciplined inquiry, our mode of operation is trial and error, directed and evaluated in terms of past experiences and memories of similar events and occurrences.

5. Perception of the Role of Technology

With our dominant orientation toward the past and a thrust for unmaking changes, we blame technology as the main cause of societal change and have little use for

it. We rationalize this position by pointing to failures of technology applications, such as the language laboratory, failed "TV classes," and unused or underused computers. (The failure to develop appropriate programs and softwares for those technological devices is not considered.)

6. Organizational Mode

We tend to rely on old "well-proven" and familiar organizational forms, and, as a rule, we operate according to authoritarian and paternalistic hierarchical organizational models. Directives come from the top, where goals and objectives are defined and modes of operation prescribed and described in operational manuals. At lower levels, freedom of choice is limited. At most we allow for choices of methods and tools. The current structure of the organization is protected — often at all cost. Change is discouraged and innovation stifled.

7. Organizational Culture and Values

The values are those of the past, and those in authority tend to be nostalgic about the past. Inherent in the associated top-down organizational and authoritarian mode is the presence of at least two different organizational cultures: (1) the culture of top management, the well stated "official culture," and (2) the employee culture, which is usually not articulated "officially."

8. Approach to Planning

In the reactive style, planning begins at the top. For example, the superintendent tells his or her associates to develop an annual plan in four months. Associates tell the next level to submit their plans in three months. Department chairs and principals have two months for this planning. Teachers, one month. Planning proceeds at the lowest level by listing current deficiencies and proposing projects or programs to remove the causes of those deficiencies. Costs and benefits are estimated on a project-by-project or program-by-program basis and the priority of projects is established. Plans usually assume the availability of more resources than will actually be received. Selected plans are sent to the immediate superior. The superior adjusts and edits the submissions, aggregates them, adds a "fudge" factor, and passes the output to the next level. This process continues until it reaches the top level, where final selection and aggregation is made, thus completing the analytical process. Ackoff suggests that reactive planning tends to be ritualistic, like an Indian rain dance performed at the end of the dry season. It has no effect on the weather that follows, but sometimes it makes those who engage in it feel good. Usually there is more concern with the dancing than the weather.

9. Approach to Working With Problems

Those of us who operate in the reactive mode tend to deal with problems separately, not systemically. Approaching each one in a piecemeal fashion, we may fail to see vital interconnections, how one problem impinges on another. As a result, we miss the essential properties of the whole. This approach is based on three misguided perspectives. One — already mentioned — is the assumption that we can find and remove the "cause" of a specific problem and thus "solve" it. The second is our belief that if we get rid of what we do not want, we will have what we want. The third is the tendency to assume that a "solution" to a problem will have only our intended results and to overlook unintentional effects. This narrow view of solutions may create new and even more severe problems.

10. Attraction

Ackoff suggests that a reactive orientation has three main attractions. First, it maintains a sense of history from which some things can be learned. Not everything that occurs is new and we add to this that not everything that is new is necessarily good. Second, this orientation expresses a desire for continuity and seeks to avoid abrupt, disruptive, and often poorly understood changes. Finally, by preserving tradition and staying on familiar grounds, we might maintain a feeling of security and stability. This feeling of stability, however, often may prove to be false. What we fail to realize is that the ground beneath us might be crumbling.

Activity

1. In small groups, discuss the reactive style. Come up with examples of this style and prepare a list of concepts or issues that need clarification.

2. In the large group, discuss the examples and formulate clarifications.

Type B: The Inactive Style (Don't Rock the Boat)

1. General Attitude Toward Change

The general attitude toward change in the inactive style is to maintain the organization in its existing state and preserve stability. The label "inactive," however, is misleading. A great deal of energy and effort is spent on keeping things as they are by resisting change.

2. Dealing With the Arrow of Time

In the inactive style, there is a desire to remain in the present: "Things may not be the best today, but they are good enough or as good as can be reasonably expected." If nothing (new) is done, little or nothing (new) will happen, and things will stay as they are, which is the goal. We want the future to be like the present.

3. The General Approach to Problem and Change Management

As a rule, those of us with an inactive style delay reacting to (external) changes or problems until a crisis threatens our stability. Then, we do the least that is required and aim at returning to equilibrium. We often say that "the best way to solve a problem is by not considering it a problem." For example, management faced with complaints will ride out the situation until people tire of complaining.

4. Perception of the Role of Science

Oriented toward maintaining the status quo, management tends to rely on an understanding of current events rather than on past experience or scientific findings. An awareness of what is going on today and connections with those in power are of paramount importance. For example, in selecting managers, who the applicant knows or is connected with may become as important as the applicant's competence.

5. Perception of the Role of Technology

With its dominant orientation toward the present and on keeping the status quo and avoiding changes, an inactive style is characterized by reluctance to bring in new technology because it might cause or force change on us. What we have now is good enough. We may not even use whatever technology we now have.

6. Organizational Mode

Given the desire to keep things as they are, our operational mode is basically bureaucratic, and the red tape slows things down, helping us avoid change. Our organizational model is the "committee model." Study groups, task forces, and commissions are formed and reformed in an endless process of gathering facts (all the facts are never in), passing on information from one group to the other, revising positions and recommendations, and persisting in this process until there is no reason any more to make a decision or introduce change.

7. Organizational Values and Culture

Organizations with a dominantly inactive style are preoccupied with conventions, customs, rules, and correct behavior. Conformity may be valued more than creativity. Loyalty to the organization and its management is most highly rewarded. Conforming to the status quo avoids troubling ambiguities and the uncertainty that accompanies change.

8. Approach to Planning

In view of the desire to avoid change, planning focuses on maintaining the current state. Recommendations by committees and study groups in time for action may be accepted, but are given insufficient resources and management support so that their failure is virtually assured. This is often justified in publicly supported organizations such as public education on the grounds that we cannot get additional support for doing something new or different. A predisposition toward such justification often prevents serious consideration of change.

9. Approach to Working With Problems

The inactive style of problem and change management, like the reactive style, calls for treating each problem separately rather than as part of a system of problems. This strategy has also been called "muddling through," a process which can usually be extended long enough to make any solution outdated.

10. Attraction

Ackoff suggests that the inactive style is practiced when the perception exists that (a) there are situations in which doing nothing is best; (b) some problems will fade away if left alone; (c) if one acts cautiously one seldom makes mistakes of catastrophic proportion. (When inactive organizations die, they die slowly.)

Activities

1. In small groups, discuss the inactive style and find examples of school practices that represent this style. Prepare lists of issues and terms that need clarification.

2. In the large group, discuss the examples and formulate clarifications.

Type C: The Preactive Style (Getting on the Bandwagon)

1. General Attitude Toward Change

In the preactive style we seek to accelerate change and exploit the opportunities it brings. Since we believe change is brought about by external forces, we do all we can to ride its tide so that we can get wherever it is going. Preactivism is the dominant style today in corporate environments and, in general, in competitive organizations.

2. Dealing With the Arrow of Time

This eagerness for change looks toward the future, which we are convinced will be better than the present or the past. Impatient with the present, we want to expedite our movement into the future. We are not willing to settle for doing well enough, but have a drive to attain the best possible operation.

3. General Approach to Problem and Change Management

Believing that the future will be very different from the past, preactivists place little reliance on experience and rely on forecasts of the future. We are more concerned about missing an opportunity than making errors. Change management means being prepared to adjust to change by predicting possible futures and being prepared for whenever and in whatever form the future comes.

4. Perception of the Role of Science

Since moving into the future depends on our ability to foresee it, we rely on and promote the "science of prediction." We augment forecasts by such science-based methods as linear programming, predictive computer models, operations research methods, program planning and budgeting, and risk analysis.

5. Perception of the Role of Technology

As preactivists we agree with the reactivists that technology is the principle cause of change. But unlike reactivists, we believe that change is good and we therefore embrace and promote technology. Thus, when the future comes we will be ready for it.

6. Organizational Mode

As preactivists our organizational purposes tend to be clearly defined. However, we have the freedom to select the means and methods of operation. We operate in a management-by-objectives mode. Being means-permissive, we are often decentralized and informal.

7. Organizational Values and Culture

Corresponding to our organizational mode, we value inventiveness over conformity. We like to be the first to try new things.

8. Approach to Planning

In the preactive mode, planning consists of predicting the future and preparing for it. It involves taking steps to minimize or avoid future threats to our organizational well-being as well as to exploit future opportunities. Planning proceeds from the top down. Future environmental conditions are forecasted by a planning staff. Based on these forecasts, goals and objectives and broad strategies for the entire organization are formulated.

9. Approach to Working With Problems

Our future orientation leads us to think about emerging problems as part of a technological future. We seek their solution or resolution by developing new techniques and technologies. We believe there are few problems that technology cannot solve. Therefore, the more we are at the cutting edge of technology, the fewer problems we will have.

10. Attractiveness

Its close association with modern science and technology accounts for much of preactivism's great appeal as well as its prestige. Accepting and advocating change, preactivists take a progressive stance at the frontiers of the future. A preoccupation with the future can give an illusion that solutions to serious problems are just around the corner.

Activities

1. In small groups, discuss the preactive style and identify examples from school practices. Prepare a list of issues or ideas that need clarification.

2. In the large group, discuss the examples and formulate clarifications.

Type D: The Interactive Style (Steering the Kayak Down the Rapids) The Design Response to Working With Change

1. General Attitude Toward Change

The interactive style is based on a desire to give direction to change rather than (a) disregard it or try to "unmake it" as the reactivist wishes to do, (b) be its victims as the inactivists are, or (c) become its enthusiastic predictors as the preactivists are. As interactivists we believe that it is in our power to steer our system in the rapids of larger societal change toward a desired future that we ourselves envision and bring about. But we must have the willingness to steer and to learn how. Working with change, our actions are guided by our vision and image of the future.

2. Dealing With the Arrow of Time

The interactivist accepts the irreversibility of the arrow of time. We consider the past and present as the context from which we can move into the future. We do not desire to return to a previous state as the reactivists do and will not settle for things as they are as the inactivists do. As interactivists, we believe that the future depends at least as much on what we do as on any outside force.

3. The General Approach to Problem and Change Management

The interactivist's general approach to change is consistent with the attitude and temporal orientations described above. While the preactivist contemplates the future by searching for what could be, the interactivist focuses on what ought to be. The key to the interactivist's approach is design: the design of a desirable future and the creation of ways to bring it about.

While the preactivist's main concern is acceptance and adaptation to forecasted futures which may evolve independently from us, interactivists believe in consciously coevolving with our changing environment and interacting with and influencing our

environmental context. The inactivist tries to hold a fixed position in a moving tide. The reactivist tries to swim against it. The preactivist tries to ride with the leading edge of the tide wherever it leads. Interactivists are not content to be swept along by the current of change but set their own course, creating a guiding image and a vision of the future and steering toward it.

4. Perception of the Role of Science

In creating our image of the future and describing the desired future state of a system, interactivists engage in the disciplined inquiry of design. This inquiry is disciplined in that it is based on the science of design and applies systems approaches and methodologies to (a) analyze the system we seek to improve, (b) formulate purposes we wish to attain, (c) create, explore, and select alternatives appropriate to the stated purposes, (d) describe the design of the future system, and (e) implement and manage the selected design. Furthermore, the interactivist develops a knowledge base for design that draws on findings of the various social and behavioral sciences.

5. Perception of the Role of Technology

Corresponding to the science-based orientation described above, the interactivist applies technology as the means for creating the image of the future and bringing it about. Unlike the reactivist who views technology as one of the main causes of problems, and unlike the preactivist who considers technology as the solution, interactivists believe that the effects and values of technology depend upon how they are used.

6. Organizational Mode

The reactivists operate according to an authoritarian and paternalistic hierarchical style. The inactivists work in a bureaucratic, red-tape-driven, decision-avoidance mode. The preactivists follow a purpose-driven but means-democratic decentralized mode. Interactivists manage change and engage in a continuous regenerating design by organizing in a fully participatory interactive mode. Such an arrangement has the capacity to best harvest the creative potential and capability of all who are part of the system.

7. Organizational Values and Culture

Inactivists are willing to settle for doing well enough. Interactivists believe that humans are more than end-seeking creatures; they are ideal seeking. Preactivists want to do as well as possible by optimizing future possibilities as they emerge. Interactivists want to do better in the future than the best they are capable of doing now. Therefore, the focus is on continual improvement over time rather than on how well we can do at a particular time under particular conditions. We pursue the ideal, knowing that we can never attain it, but that it is the best guide for our development as an organization.

8. Approach to Planning

The interactive concept of planning implies two major operations — designing the desired future and planning the means for its attainment. In the reactive style, plans devised at the top become the context for implementation below. The inactivist's planning focuses on trying to maintain the status quo. The preactivist attempts to acquire the expert's prediction of the future and prepare for it. As interactivists we design our own desired future and plan interactively within our system and with other systems in the environment to bring it about.

9. Approach to Working With Problems

The reactivists deal with problems in a piecemeal fashion, trying to find and then remove the cause of the particular problem. Inactivists have a somewhat similar approach as they treat problems separately and disjointedly, doing as little as possible by muddling through. Preactivists believe that most problems can be fixed by technologies and are in constant search for new ones. Interactivists believe that we fail most often because of an inability to face the right problems rather than because we lack the resources and ability to solve the problems at hand.

10. Attractiveness

It must be obvious to the reader that we have a bias for the interactive style. We are proponents of this style of managing change and pursuing organizational purposes because we believe that it effectively addresses our current knowledge explosion, accelerating societal and technological change, increasing organizational complexity, and environmental turbulence and uncertainty. This style enables us to shape our future rather than to be victims or recipients of the changes around us. Furthermore, the interactive mode is the only one that explicitly attempts to harness individual and collective creativity and aspirations, while addressing individual, organizational, and societal development and improving the quality of life.

Activities

1. In small groups, discuss the interactive style and find examples from current educational practices of this style. Prepare a list of issues or items that need clarification.

2. In the large group, discuss the examples and formulate clarifications.

Final Activities

1. A General Assessment of Styles:

After reviewing and discussing the four change styles above, compare and assess those styles to explore the advantages and disadvantages of their application in educational settings. Explore them in the large group. The assessment can be guided by the following inquiry:

a. Consider each style. Ask the question, Compared to other styles, in what organizational settings and in relationship to what issues or what situations would a particular style be most effective?

b. What are the organizational arrangements, issues, and situations in the context of which each style would not work?

c. Consider each style and make a general judgment of why that particular style would or would not work in your particular school setting.

d.Select a preferred style and tell why.

e. Identify issues that may require further exploration and formulate questions that invite answers or clarification.

2. Formulating a Desired Style of Change Management:

a. Working individually, prepare a draft that highlights your ideas and recommendations for a preferred style of change management for your own educational system.

b. Meet with members of your team to share and discuss these drafts and advise each other on their further development.

PART III: INITIATING AND SUPPORTING THE DESIGN EFFORT

Up to now we have been concerned with preparation for design. The final section of this guide is concerned with responsibilities of the leadership group for the initiation and continuing support of an educational systems design effort in their community.

THE COMMUNITY'S ROLE

Why should a community take charge of designing its systems of learning and human development? How is this related to community development?

Designing and implementing systems of learning and human development are at the very heart of community development. Without these activities, no people-centered, authentic and sustainable development is possible. To be both authentic and sustainable, educational systems must be designed by those who own and use them. They cannot be legislated or bought from experts. If the privilege and responsibility for design are given away, others will take charge and shape our futures for us.

Authentic and sustainable community development is a process of economic, social, and political change for realizing the collective aspirations and expectations of a community's members while supporting their continuing growth. Such development depends on the best possible use of a community's resources, including those that reside in its public and private agencies and organizations.

Development is authentic if it builds on the values and ideas of people in the community, reflects their collective vision of humanity, makes use of individual and collective talents, and challenges people to realize their fullest potential.

Development is sustainable if it is supported by creative participation of members of the community. Active participation enables members of the community to (1) better understand their community and its potential; (2) nurture the creativity that makes it possible for individuals and groups to contribute to the development of their community; (3) incorporate their individual and collective aspirations and values into the design of their systems and their community; (4) generate consensus among those who participate; and (5) ensure that people will take part more effectively and with a deeper level of commitment in the implementation of the design that emerges.

The approach characterized above offers a way of thinking about whether a community or an organization is developing by design or if it is merely addressing problems associated with growth. (Development is a change in quality; growth is a change in quantity.)

How can community members be empowered individually and collectively to engage in the kind of development described above? We propose that well-designed and integrated systems of learning and human development can provide the necessary arrangements, opportunities, and resources to nurture (1) human potential and uniqueness, (2) an inner quality of life, (3) interest in improving one's own life and the lives of others, and (4) the acquisition of necessary technical know-how, intellectual prowess, ethical and moral awareness, and personal and social responsibility.

DEVELOPING ORGANIZATIONAL CAPACITY AND CAPABILITIES

> How to build a community of inquiry is the quest.
>
> — David Schon*

Building the needed organizational capacity and individual capabilities to carry out organizational inquiry and design may require rethinking the more traditional roles and responsibilities normally associated with school systems. Since rethinking practices that are "tried and true" is usually a difficult process, support from leadership will be crucial. It is important to point out that we are not referring specifically to the new roles or responsibilities that might be required for operating a new educational system. Those cannot be defined until after the new system has been designed. For now, our concern is with the characteristics necessary for an organization to engage in inquiry about itself.

Organizations are arrangements of people who work together to achieve mutually agreed-upon goals. Organizations must have procedures for making decisions. They delegate to individuals the authority to act. They set boundaries between themselves and the rest of the world, establishing relationships and influencing the nature of interactions.

Organizations develop their own purposes, procedures, and culture. The resulting climate can discourage change or, at the other extreme, make an organization vulnerable to unmonitored schemes or decisions. Organizations can be heavy users of energy and resources and accomplish little. Or they can make substantial and effective changes fueled mostly by enthusiasm. No extreme bodes well for the long-term health of an organization.

Ideally, organizations should attempt to create climates that encourage grand visions for the organization as a whole as well as innovative ideas for its parts. Our educational systems are faced with social and educational issues and challenges requiring

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* Presentation, AERA, April, 1990, Boston, MA

responses that are, for the most part, beyond their capacity. If systems inquiry and design are to become normal behavior for educational organizations, new capabilities must be developed.

The Emerging Organization

What kind of educational organization will support continual inquiry and design? Three general characteristics are described below. They are interactive and mutually supporting.

1. Appropriate Relationships With the Environment

The current boundaries of educational systems reflect traditional relationships. For example, educational systems tend to base their attendance rules on geographical boundaries. Instruction routinely occurs in classrooms, within schools. Relationships with the external environment — the community, for example — tend to be low level, based on the exchange of information, and largely symbolic.

Boundaries, like all organizational characteristics, need to be examined in light of possible new purposes and policies. (See the Design Framework introduced in Part I.) For example, a reexamination of the traditional boundary of information exchange between school and community might lead to a relationship of cooperation, collaboration, or even integration.

Schools might enter into new partnerships with the community to consider and accomplish community goals such as literacy training, job training, parenting education, preschool services, community education, etc. Or, at a more ambitious level, the various learning, growth, and developmental needs of a community might be reconceptualized into an integrated system to support the growth and development of community members of all ages. If the traditional boundaries between the present educational system and the community are revised, new roles and responsibilities for educators and others will inevitably emerge.

2. Organizations That Can Learn

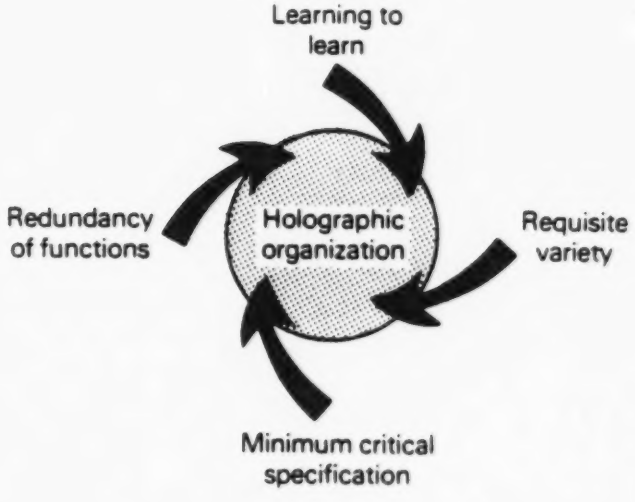
Organizations <u>do</u> learn. They modify their behavior in response to occurring or anticipated environmental changes or pressures. Whether this learning is single loop or double loop depends partly on the established culture or norms of behavior within the organization and partly on the organization's structure and processes.

Over time, organizations develop policies, norms, and ways of behaving that are unique. Under stable conditions these may serve the organization well. But if the organization holds on to these policies and norms and persists in its conventional behavior in the face of substantial change, it risks loss of support and even its own survival. The basic question is, how can the organization, through its structures, processes, and interactions, develop the capacity to engage in productive inquiry and design? In other words, how can we create an organization that can learn and design?

Just as some parts of the brain are able to pick up functions lost by damaged brain areas, in an organization that has what Morgan (1986) calls "holographic capability," various parts are able to perform the same functions. This means that if one part is unable to perform, another part can pick up those functions. This "back-up" capability also offers rich development possibilities. Four principles of holographic design provide a challenging set for guiding organizational design (see Figure 3).

Figure 3

Principles of Holographic Design



From Morgan, G., Images of Organization (Beverly Hills: Sage Publications, 1986).

Redundancy of Functions. This principle says that organizations need excess capacity. Redundancy of functions permits the organization to be more flexible and to self-organize in response to need or opportunity. One kind of excess capacity is replacement or back-up potential. Another, more important, capacity calls for individuals within the organization to develop multiple skills or competencies important to the organization. This permits the organization to form semi-independent groups to perform functions that may be outside each member's normal responsibilities. By stressing redundancy and minimizing specialization, an organization creates more opportunities for the growth and development of its members, and therefore of itself. There are, of course, practical limits to the amount of redundancy that can or ought to be developed. Therefore, the principle of requisite variety is introduced (Ashby, 1952).

Requisite Variety. The internal variety of any organization ought to match the complexity and variety of the environment in which it exists. If the organization exists in an unchanging environment, complexity and variety are not important issues. However, when the larger environment is turbulent and demands on the organization are complex, requisite variety becomes an important organizational characteristic. The organization can develop multiskilled individuals or multiskilled teams that possess the requisite knowledge and skills. A second aspect of requisite variety is ensuring the presence of alternative viewpoints concerning issues, problems, or design characteristics. This helps prevent the unobstructed continuation of untested policies or practices.

Minimum Critical Specification. Classical organizational theory recommends that structures, roles, and responsibilities be as clearly defined as possible. The principle of minimum critical specification proposes the opposite. Flexibility and conditions that encourage self-organization are highly valued. Leadership plays a facilitating role, establishing a work environment in which an organization's members can interact for the purposes of inquiry. This flexibility achieved through minimal critical specification helps the organization to avoid the overly bureaucratic tendencies that can stifle growth and development. On the other hand, too much flexibility can lead to disorganization and loss of direction. To counteract this, the organization needs to learn how to learn.

Learning to Learn. Organizations that learn are those that can engage in both the single-loop and double-loop learning described earlier. This occurs when management establishes an environment that encourages and rewards continuous creative inquiry about its purposes and practices, builds autonomy in groups and individuals, rewards creative behavior, facilitates leadership behavior for others, builds effective teams, fully integrates new members into the organization, works to correct ineffective behavior, and promotes both individual and group learning through comprehensive professional development activities and opportunities.

3. Organizational Technology

How well the organization is able to process both information and resources is critical to its health and survival (Miller, 1978). Brief descriptions of some key processes as defined by Mills (1990) appear in Table 3. A measure of organizational effectiveness can be obtained by assessing how well each of these sets of processes are handled by the organization. To do this, an organization can develop a description of how each of the processes ought to work, thus creating its own criteria for evaluating, reaching consensus, and eventually designing procedures by which these critical activities can be carried out.

The three general characteristics discussed above as enablers of organizational inquiry and as goals for design process — relationships with the environment, organizational learning, and organizational technology — are interactive. For example, expanding organizational relationships will inevitably result in new information that needs to be processed and new values to be considered. That new information will ultimately influence the educational design.

WORKING WITH BARRIERS

The general theme of this guide has been that we should question the usefulness of our current educational system as well as the wisdom of our current Band-Aid response to educational reform. Thus far, the guide has focused on systems design as the needed response, attitudes about change and how such attitudes influence reform, formulating guidelines for the systems design effort, and initiating and supporting the effort. The final section of this guide addresses the kinds of barriers that can interfere with systems design and change. Such barriers are inevitable and very powerful. Therefore, they must be addressed directly as part of the process itself.

Changes in educational systems have tended to be incremental. Thus, educational improvement has depended on the accretion of many small changes, for example, textbook adoptions, a new teaching practice, grouping procedures, etc. The change process has primarily occurred as a result of the gradual infusion of ideas and their assimilation (a grass roots idea) or through policy decisions at higher levels calling for a new curriculum, testing program, reporting mechanism, etc. (a top-down approach). As a result, most changes in educational systems could be characterized as adding, substituting, or eliminating something. More recently, restructuring existing activities, processes, or arrangements, without necessarily changing the fundamental design, has become an important part of the reform movement.

A discussion of the incremental or nonsystemic approach to educational reform in terms of its effectiveness was presented earlier. In spite of its weaknesses as an approach to bringing about fundamental redesign of our educational systems, an emphasis on incremental change is common. One reason is that small-scale changes are

easier, partly because little is disturbed in the larger system and therefore less organizational resistance is encountered. Second, small-scale change usually means quicker, albeit small-scale, wins. Although the rewards of incremental changes may be small, the quicker payoff and subsequent reinforcement is an attractive feature. Third, thinking about systemic reform in a complicated social system such as education is a daunting task.

By and large, we avoid daunting challenges when possible. But we have suggested that the mismatch between what our present educational system can accomplish and what is needed is so large that a systems design effort is needed in addition to conventional improvement efforts.

Some Barriers to Design

Perhaps the most significant barriers to educational reform at the system level stem from the culture of the organization in which change is being considered. Elements of the culture that impede system design include:

- Resource allocation. Much of the available energy within a system is used to perform routine operations and maintain existing relationships. There is normally little left over for the system to engage in inquiry about itself.

- The organizational structure, decision-making processes, and incentive system within most school systems mitigate against systems design thinking. For example, the existing structure, with each classroom or department separated from the others, encourages a "shopping mall" mentality. As a result, territories and sometimes indifference to neighbors (colleagues) develop. Decision making at the larger organizational level is centralized, with the result that vested authority is often substituted for a systemic design process as the basis for decision making. At the other extreme, more recent restructuring strategies (e.g., site-based management) will not promote systemic design.

Other barriers to systemic reform are present in all individuals. Our capabilities for systemic thinking are restricted in varying degrees by viewpoints, by the drawing power of specific problems, by possession of favored solutions regardless of their appropriateness, and, to some degree, by tendencies to use available power to win the day rather than utilize negotiation and integration as primary techniques. The four change styles, described in Part II, represent a way of classifying and articulating change barriers within the organization. To some extent, they are a continuum, with the reactive representing the most severe set of barriers and the interactive providing the most facilitative conditions.

Dealing With the Barriers

We have proposed a process that in itself will go a long way toward eliminating or at least mitigating against some of the common barriers to design. A number of guiding principles for the design inquiry were suggested (Figure 1) and should be revisited. These provide the basis for creating a process that will address most of the barriers.

Through their participation, members of the organization alter the culture of the organization. Decision making about purposes, policies, practices, and procedures becomes traceable to the design process. Individual parochialism lessens, and departmental and turf issues are more likely to be resolved when the system is kept in mind. Primary attention to problems of the existing system and their individual solutions shifts to designing the desired educational system of interconnected components.

Other barriers to systems design have to do with the absence of knowledge and skills concerning the process and lack of adequate experience for the process. For the most part, the knowledge base concerning design and the need for it in social systems like education have been ignored by university preparation programs. It is hoped that this professional development package will help fill that gap.

Table 3

INFORMATION PROCESSES

• **Acquiring Information** addresses processes and mechanisms that bring information into a school and that receive information from components within the school. Typical school activities include: requesting or locating information, monitoring, observing, testing, and other forms of data collection.

• **Screening Information** addresses those processes and mechanisms that protect the school from environmental stresses by selectively excluding or permitting entry of information. Typical school activities include: screening, confirming or verifying, routing, and restricting information.

• **Translating Information** addresses those processes and mechanisms that alter or prepare information received from outside the school for use within the school and that prepare informal information for use outside the school. Typical school activities include: restating, interpreting, and summarizing information.

• **Communicating Information** addresses those processes and mechanisms that provide routes over which information is transmitted to all parts of the school and that transmit information within the school over channels into the school's environment. Typical school activities include: sending and circulating information, using channels, reporting and presenting information, providing feedback.

• **Analyzing Information** addresses those processes and mechanisms that carry out learning by forming enduring associations between items of information. Typical school activities include: reviewing information, specifying or defining needs, organizing information, evaluating data, predicting or projecting conditions, expenditures, etc.

• **Storing & Retrieving Information** addresses those processes and mechanisms that store information in the school for different periods of time. Typical school activities include: maintaining records, files, and other data and locating information in records, files, and other storage areas.

• **Applying Information** addresses those processes and mechanisms that receive information from all parts of the school and utilize this information to provide guidance, coordination, and control of the school. Typical school activities include: setting objectives, prioritizing needs, designing or planning improvements, scheduling and allocating time, problem solving, resolving conflicts, approving or recommending actions, implementing, giving recognition, providing encouragement, regulating and controlling behavior, disciplining.

Table 3, continued

RESOURCE PROCESSES

• **Acquiring Resources** addresses those processes and mechanisms that bring human and material resources into the school. Typical school activities include: recruiting or hiring personnel, ordering, replenishing, replacing, and upgrading materials and equipment.

• **Screening Resources** addresses those processes and mechanisms that protect the school from environmental stresses by selectively excluding or permitting entry of people and materials. Typical school activities include: protecting or safeguarding personnel and facilities, routing and restricting personnel.

• **Distributing Resources** addresses those processes and mechanisms that carry resources from outside or within the school to the school components that need them. Typical school activities include: sharing or allocating resources and providing material rewards and incentives.

• **Creating & Adapting Resources** addresses those processes and mechanisms that change resources into more useful forms. Typical school activities include: making, constructing, or otherwise producing materials, and modifying or altering materials and equipment.

• **Using and Maintaining Resources** addresses those processes and mechanisms that use school resources for the purposes of product development, outcome achievement, growth, damage repair, or component replacement. Typical school activities include: using and duplicating materials and using and repairing equipment.

• **Storing & Retrieving Resources** addresses those processes and mechanisms that store resources over time and retrieve them when needed. Typical school activities include: stockpiling and storing materials, supplies, and equipment, and issuing materials, supplies, and equipment.

• **Transmitting Resources** addresses those processes and mechanisms that send resources out of the school as products or waste. Typical school activities include: shipping materials, sending reports, removing or discarding equipment, and transferring personnel.

• **Maintaining Spatial Relationships** addresses those processes and mechanisms that maintain spatial relationships between school components so they can interact properly. Typical school features or structures include: physical layout, component separation, interior passages, and exterior pathways.

CONCLUSION

By completing the readings and activities of this guide you have (1) developed a general understanding of systems design as it applies to education, (2) explored some guidelines and boundaries for a systems design effort, (3) considered four general attitudes toward change, and (4) learned about the importance of both the community and the educational organization in initiating and sustaining a design effort. The importance of the leadership group's role within a community to initiate and support the effort cannot be overemphasized.

The leadership group must be able to explain the need for and the nature of the systems design process to educators, community groups, parents, students, the business community, and other important stakeholders. This communication requirement must be taken into account when selecting design leadership.

The leadership group will provide overall guidelines by establishing the primary focus for the design effort, the boundaries of the inquiry, and the kinds of relationships that ought to exist between the educational system and the community. In a real sense, the leadership group sets the design policy for use by the core design team.

The leadership group will need to maintain a close working relationship with the core design team to ensure that continuous guidance and support is available. A systems design process that is participative, disciplined, and comprehensive requires considerable patience. The confidence to submit all existing characteristics of an educational system to inquiry and possible change is unusual. The willingness to imagine and design an ideal educational system without reference to the existing system is uncommon. The temptation will be strong to retreat to the more conventional forms of planning in which participation is limited, some aspects of the existing system are declared untouchable, and the design process begins to attend to elements of or problems within the existing system.

Finally, the leadership group has a role in helping establish and maintain necessary resource support. In addition to commitment, the design process requires expertise and time. Although every community will define its own resource needs and sources, funds will be necessary for personnel, materials, and other expenses the process may entail.